Journal of Research on the Lepidoptera 19(2): 65-67, 1980(81)

Nantucket Pine Tip Moth, *Rhyacionia frustrana*, in Kern County, California: Integrated Control and Biological Notes (Lepidoptera: Tortricidae, Olethreutinae)

Dennis M. Poore

Kern County Department of Agriculture, Bakersfield, California 93302

Abstract. *Rhyacionia frustrana* had four generations on Monterey pine (*Pinus radiata*) in the San Joaquin Valley of California during 1974 with summer generations of approximately six weeks. In California, the moth prefers *P. radiata*, but has been found in association with eight other pine species. The use of chemical, biological and cultural control practices has evidently lead to its eradication in a Kern County pine plantation.

The Nantucket pine tip moth, *Rhyacionia frustrana* (Comstock), is known to have a wide geographical distribution. Powell and Miller (1978) show the following range: Central America (Guatemala, Honduras and Nicaragua), southern Mexico (Oaxaca State), West Indies (Cuba, Jamaica and Dominican Republic), eastern United States (eastern Texas and Florida, north to Missouri and Massachusetts). This pine tip moth was probably introduced into California on infested nursery stock from the eastern United States sometime in the late 1960's, according to information assimilated by a task force of various State and Federal agencies. In California five counties (San Bernardino, San Diego, Riverside, Orange and Kern) have been known to have infestations. The hosts[1] recorded for *R. frustrana* in California are *Pinus attenuata* Lemmon (Knobcone pine); *P. canariensis* Sweet ex K. Spreng. (Canary Island pine); *P. halepensis* Mill. (Aleppo pine); *P. jeffreyi* Grev. and Balf. (Jeffrey pine); *P. nigra* Arnold (Austrian Black pine); *P. radiata* D. Don. (Monterey pine); *P. roxburghii* Sarg. (Chir pine); *P. sylvestris* L. (Scotch pine); *P. thunbergiana* Franco (Japanese Black pine) (personal communication - T. D. Eichlin, Insect Taxonomy Laboratory, California Department of Food and Agriculture). Nine species of pines (excluding exotics and ornamentals) in the eastern United States have been recorded as hosts (Powell and Miller, 1978).

Rhyacionia was first detected in Kern County on November 10, 1971. The specimens were collected from Monterey pines (which is the preferred host in California) at a Christmas tree farm, Kern County, Wasco, California, Section 36, Township 26s. Range 24e. M.D. The damage by burrowing larvae caused severe dieback to the terminals. The dieback

[1]Not all hosts have been confirmed from rearing records

caused secondary and lateral shoots to form, which resulted in reduced growth, misshappen and compacted trees.

During 1974, the life history of *R. frustrana* on Monterey pines at the infested Christmas tree farm was determined. Peak flight was determined by extrapolation from numerical counts of larvae, pupae, pupal cases and adults. The major flight of adults from overwintering pupae occurred April 15; first generation peak flight was May 30 (∓ 3 days); second generation peak flight was July 10 (∓ 4 days); third generation peak flight was August 28 (∓ 4 days). The summer generations took approximately six weeks to complete development. A total of four generations occurred. Brown and Eads (1975) postulated that in San Diego County *R. frustrana* had four broods annually. Yates and Beal (1962) stated that *R. frustrana* has two to possibly five generations annually in the southeastern United States, depending on latitude.

A chemical and a biological control agent were applied in 1976 in an attempt at eradication (See Table 1). Surveys were conducted in late summer through fall to determine efficacy of the materials. In the tree farm, only three live pupae from a single Monterey pine were found on October 7, 1976. No insecticides were applied during 1977 and 1978. During 1977 surveys for the pest, only a single larva was found, which was observed in September. No other specimens of the pine tip moth have been collected subsequently.

Table 1

Insecticides Applied During 1976

APPL. DATE	MATERIAL*	RATE/ACRE	APPL. METHOD
3/30	carbaryl - D	5 lbs. a.i.	Back pack duster
4/14	B. T.	50 lbs.	Fixed wing aircraft
4/27	carbaryl - D	6 lbs. a.i.	Fixed wing aircraft
5/11	B. T.	60 lbs.	Fixed wing aircraft
5/25	carbaryl - D	6 lbs. a.i.	Fixed wing aircraft
6/8	B. T.	37 lbs.**	Fixed wing aircraft
6/22	carbaryl - D	6 lbs. a.i.	Fixed wing aircraft
7/6	carbaryl - D	6 lbs. a.i.	Fixed wing aircraft

a.i. = active ingredient

B.T. = *Bacillus thuringiensis* (Berl.)

*Used under S.L.N. registration CA-760011 and CA-760012, Dipel® 1 Dust and Sevin® 10 Dust, respectively.

**Expended all available material for the project.

Tree shaping by terminal tipping done at three to four week intervals in 1977 and 1978 was, in fact, a cultural practice aiding in control of the pest. At the same time, any chlorotic tips were also removed and crushed.

R. frustrana had four generations on Monterey pines in the San Joaquin Valley during 1974 with summer generations of approximately six weeks duration. The application of *Bacillus thuringiensis* (Berl.) and carbaryl at bi-weekly intervals suppressed the tip moth's population to a very low level. Following continuous terminal tipping at three to four week intervals, no specimens have been collected since September 1977.

Literature Cited

BROWN, L. R. & C. O. EADS. 1975. Nantucket pine tip moth in Southern California: Identity and Insecticidal Control. Jour. Econ. Entom. 68(2): 380-382.

POWELL, J. A. & W. E. MILLER. 1978. Nearctic pine tip moths of the Genus *Rhyacionia*: Biosystematic Review (Lepidoptera: Tortricidae, Olethreutinae). U.S.D.A. For. Serv. Agric. Handb. 514, 51 pp.

YATES, H. O. & R. H. BEAL. 1962. Nantucket pine tip moth, U.S.D.A. For. Serv., For. Pest Leafl. 70, 4 pp.